



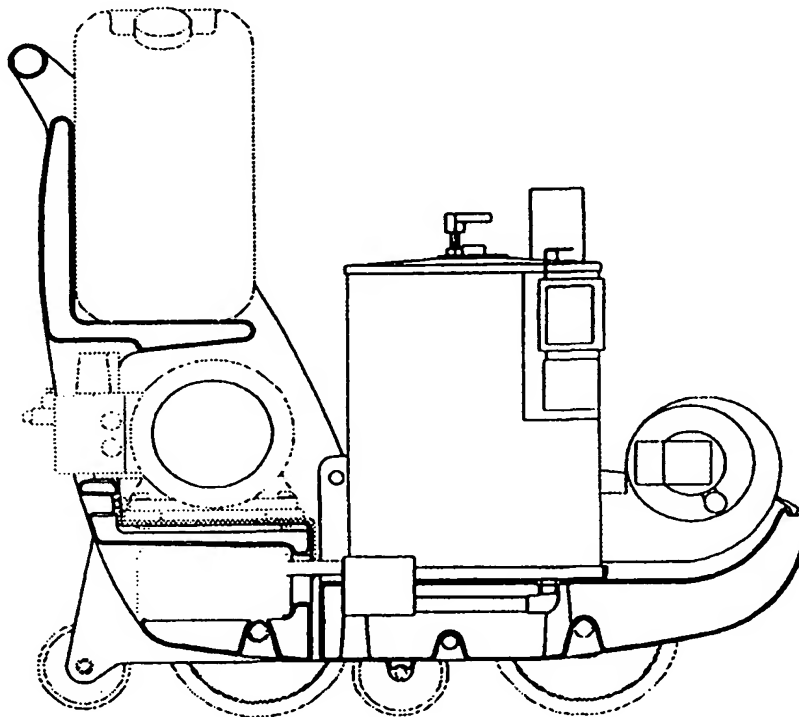
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: MULTIPURPOSE HYDRO-MACHINE WITH VARIOUSLY ASSEMBLED MODULES

## (57) Abstract

The invention is a new multipurpose machine for cleaning surfaces and floors in general provided with an independent basic module which can be assembled with more modules endowed with various fittings according to the different user's needs. The basic module is provided with wheels (1.3), supports for the nozzles, tanks and force pump assembly (4) for the nozzles. The other modules consist of a boiler assembly (3.2) and heating exchanger, a feedbox (3.4) for taking and mixing the sand with the water under pressure; an intaking liquids-vacuum cleaner assembly, the tanks (3.5, 8) for additives and detergents, specific nozzles (5); a floor cleaning assembly with vacuum cleaner provided with rotating brushes (6) and floor-cleaning bar (7).



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***MULTIPURPOSE HYDRO-MACHINE WITH VARIOUSLY  
ASSEMBLED MODULES***

**DESCRIPTION**

This patent relates to the field of industrial and/or professional  
5 cleaning machines and particularly regards hydro- machines, in  
the case in point hydro-cleaning machines, hydro-sandblasting  
machines, floor cleaning machines, vacuum cleaner and the like.

Cleaning machines with particular functions and facilities are  
being used according to the surface and to the kind of dirty to be  
10 clean.

Hydro- cleaning machines shoot an high pressure water jet and are  
essentially provided with a motor pump and a nozzle to localize  
the water jet under pressure.

Hydro-cleaning machine are used for removing simple dirty such  
15 as mud, stratified dust, strong but superficial organic substance  
from particularly delicate surfaces.

Hydro-sandblasting machines shoot a water jet under pressure  
mixed with sand. The water in pressure, thanks to the Venturi  
effect, intakes the sand from its tanks and conveys it at an high  
20 speed on the surface to be clean. The hydro-sandblasting  
machines are particularly used for removing the deeper paint from  
the surfaces, and for abrading stone materials, etc.

Other kinds of hydro-cleaning machines are provided with devices  
for heating water and/or adding a variable concentration of  
25 additives, solvents, chemical agents to the water during their use.

Each kind of machine above mentioned can carry out specific functions i.e. for example, some hydro-cleaning machines are provided with devices for being turned into hydro-sandblasting machines without heating the water and without adding soaps or solvents.

In any case, the hydro-machines require some additional devices or often a further distinct unit for heating and using water, for adding additives, using sand, etc.

Small firms especially craft firms often buy only hydro-cleaning machines and then, during their activity, they need hydro-sandblasting machines, and further hydro-cleaning machines possibly arranged for using simultaneously chemical solvents or detergents. The firms are therefore compelled to buy a machine with all requirements they need or to buy distinct units to couple with the machines already in their possession. The costs for buying additional machines isn't often justified by the bulk of work to carry out.

In order to overcome to the above mentioned drawbacks a new type of multipurpose hydro-machine has been designed and implemented.

The new hydro-machine is provided with several modules variously assembled to a main module or basic module, including a frame, a main body with a pump, some supports for the nozzles and a tank to which some devices such as an heating module, a module with feedbox or with tank for the sand, a module with

attachments particularly suitable for centers, a floor cleaning module with brushes and an intaking module for liquids can be added by means of quick coupling devices.

5 The basic module is provided with wheels whereas the other modules can either be provided with wheels, in order to aid their movements and discharge their weight to the ground, or be lacking of wheels, in this case at least a module with wheels is added.

Essentially, the modules are divided in a basic or main module and in various modules coupling with the main one and carrying the  
10 other complementary parts, wherein the quick coupling system allow to easily coupled and uncoupled the various modules with rapidity and ease.

The basic or main module consists of a structural frame with handle or handgrip, provided with a lower plane with lateral  
15 wheels. Some supports are fixed to the structural frame for putting the nozzles back when are not utilized, the force pump which sends water or air to the nozzles is fixed to the frame as well. On the same plane it is possible to insert a battery with suitable features for the electrical feeding of said force pump, while the  
20 structural part of the frame, opposite to the handle or the handgrip, is arranged for being coupled with the structural frame of one of modules following described.

It is possible to fixed a second plane over the lower plane. One or more tanks are positioned or solidly fixed on each plane or only

on the lower one. Said tanks contain, for example, water and an additive such as a detergent.

A first additional module consists of a frame with a plane provided with two wheels wherein the frame shows some ends  
5 suitable for being coupled with the structural frame of the main module. On said additional module an heating assembly consisting of an heating exchanging chamber and a burner is housed.

A second additional module consists of a structure frame with a plane provided with two wheels wherein the frame shows some  
10 ends suitable for being coupled with the structural frame of the main module. On said additional module, a feedbox containing sand or other equivalent products is housed.

A third additional module consists of a frame with a plane provided with two wheels wherein the frame shows some ends  
15 suitable for being coupled with the structural frame of the main or basic module. On said additional module a vacuum cleaner assembly, an intaking liquids assembly and one or more tanks containing additives and/or detergents, some particular nozzles such as nozzle-foam and/or nozzle-floor are lodged.

20 A fourth additional module consists of a floor cleaning assembly which includes a vacuum cleaner provided with brushes with vertical axis and rear floor cleaning bar and wherein said module is provided with two wheels whereas the frame is endowed with ends for being coupled with the structural frame of the main or  
25 basic module.

The various modules are provided with jacks and connection ducts to join together nozzles, pumps, heating exchangers, tanks and the other parts besides the various electrical connections.

The various modules can be assembled with the basic module  
5 according to the needs and the functions required.

The basic hydro-cleaning module can be assembled with other modules in order to obtain an heating hydro-cleaning machine or a sandblasting machines, or an hydro-cleaning machines for particular operations, or a floor cleaning machines, simply adding  
10 the proper module to the main one.

The hydro-machine consists preferably of a main or basic module provided with a frame, a main body with pump and supports for the nozzles and the tanks to which is possible to join, by means of quick coupling devices, several modules variously assembled:

- 15 a module with heater
- a sandblasting module with feedbox or tank for the sand,
- a module intaking dust or liquids,
- a floor-cleaning module with brushes and intaking liquids device,
- a toolholder module (for brooms, sponges, detergents),
- 20 a moquettes-washing module.

The main or basic module consists of a structural frame with handle or handgrip endowed with a lower plane and three or four lateral wheels. The wheels have two different diameters that is the rear wheel/s are smaller than the front ones and are positioned so

that the rear wheels are raised from the ground when the basic module is joined to one of the other modules.

The structural frame is internally provided with some housings for putting back the nozzles when are not used, the force pump, and a  
5 possible battery for the electrical feeding of the pump, whereas the structural part of the frame, opposite to the handle or the handgrip, is arranged for coupling the structural frame with one of the other modules.

Particularly, the coupling between the basic module and an  
10 additional module assures a quick and safe connection and reduce the coupling and uncoupling operations as little as possible. The junction is possible by means of one or more coupling pins. The various electrical, water and pneumatic connections are possible by means of the coupling of the two modules. Actually,  
15 appropriate electrical connectors and pneumatic seal unions are positioned on the surface or on the junction edges between the modules.

A further innovative part of the new hydro-machine is that the covering or the case of the basic module instead of doing the  
20 function of simply covering the basic module can be utilized, in a different arrangement and combination, both as a covering of the basic module and as a covering of each additional module.

Thus, it is possible to assembly the main hydro-cleaning module with the other modules obtaining, simply adding the suitable  
25 module to the main one, an heating hydro- cleaning machine, or a



sandblasting machine, or an hydro-cleaning machine for particular purposes, or a floor-cleaning machine.

The new hydro-machine as described above, solves completely all the problems cited in the introduction. In fact, it is possible to  
5 obtain an hydro-machine with various and amplified functions simply removing the covering or the case of the main module, coupling the main module with an additional one and positioning the covering or the case previously removed on said hydro-machine. All that can be obtained by means of few and easy  
10 operations carried out quickly and with safe working.

Each additional modules consists of a framework with plane provided with two wheels and edges or fittings for coupling the structural frame with the main module. The additional module is endowed with jacks and connection ducts in order to put together  
15 nozzles, pumps, heating exchangers, tanks and other parts besides the various electrical connections.

An heating assembly consisting of a burner with heating exchanger is housed on the first additional module (warm water). Said module allows the main module to work as an hydro-thermo-  
20 cleaning machine.

A feedbox containing sand or other equivalent products is housed on the second additional module (hydro-sandblasting) by means of which the basic module is able to become an hydro-sandblasting.

A vacuum cleaner assembly, a module for intaking liquids, one or  
25 more tanks for additives and/or detergents, and some particular

nozzles such as nozzle-foam and/or nozzle-floor are positioned on the third additional module (vacuum cleaner module/ module for intaking liquids).

5 A floor cleaning assembly including a vacuum cleaner provided with brushes with vertical axis and rear floor cleaning bar are positioned on the fourth additional module (floor-cleaning).

Some housings holding bottles and containers for detergents and some supports for the brushes, sponges and brooms are lodged on the fifth additional module.

10 Some brushes, sprayers, tanks for dirty cleaning water, and other fittings for cleaning moquettes are mounted on the sixth additional module.

The new hydro-machine as described above can overcome the drawbacks cited in the introduction. In fact, a small firm can buy,  
15 at a first stage, only the main module and then acquire the other modules according to the practical needs. The hydro-machine which results has exactly the features desired and moreover consists of only a body easy to transport and to move without removing more objects not connected together.

20 The attached tables show by way of example, but not limitative, an embodiment of the invention.

Figures 1a, 1b, 1c, show three views, as an example, of the basic module consisting of a structural frame (1.1) with the lower plane (1.2) and wheels (1.3), and a force pump for the water (4).

Figures 2a, 2b, 2c, show three views, as a further example, of the basic module consisting of a structural frame (1.1) with the lower plane (1.2), the wheels (1.3), the force pump for the water (4) and the tank (2).

- 5 Figures 3a, 3b, 3c, show three views of an additional module consisting of a structural frame (3) with wheels (3.1) supporting a boiler (3.2) with burner (3.3) for the heating.

Figures 4a, 4b, 4c, show three views of the second additional module consisting of a structural frame (3) with wheels (3.1)  
10 supporting a feedbox (3.4).

Figures 5a, 5b, 5c, show three views of a further additional module consisting of a structural frame (3) with wheels (3.1) supporting an intaking assembly (3.7), the tank (3.5) and provided with nozzles (5).

- 15 Figures 6a, 6b, 6c, show three views of a further additional module consisting of a structural frame (3) with wheels (3.1) provided with floor cleaning assembly with brushes (6) and the relating motor (6.1), with cleaning bar (7) and the tank for cleaning liquid (8).

- 20 Figure 7 shows one of the possible assembling wherein the basic module is joined to the heating assembly.

Figures 8 - 15 show the various junction phases between the basic module and an additional module:

figure 8 shows the basic module to be used as independent device;

figure 9 shows the basic module with the covering of the tanks for the additives or detergents removed;

figures 10 and 11 show two removed coverings;

figures 12 and 13 show the covering positioned on the additional  
5 module;

figure 14 shows the additional module joined to the basic module;

figure 15 shows the coverings, previously removed, positioned on the basic module and on the additional module joined together.

These are sufficient schematic indications to allow an expert  
10 person to put the project into effect; consequently, in tangible application, some variations may be made without affecting the substance of the innovative concept.

Therefore, with reference to the above description and to the enclosed tables, the following claims are put forth.

## CLAIMS

1. Multipurpose hydro-machine characterized in that it comprises a main or basic module which is independent and can be assembled with various modules provided with different fittings,  
5 and wherein said basic module is endowed with wheels, supports for the nozzles, tanks and force pump for the nozzles.
2. Hydro-machine, according to claim 1, characterized in that the basic module is provided with four wheels of which two are small and two big, and wherein said small wheels are set in the rear  
10 position of the basic module, and wherein said small wheels are raised when the basic module is coupled with the additional module.
3. Hydro-machine, according to claims 1, 2, characterized in that it comprises a module to be joined with the main module, said  
15 module is provided with a boiler assembly and an heating exchanger and the relating devices for electrical and water connection, etc.
4. Hydro-machine, according to claim 1, 2, characterized in that it comprises a further module provided with wheels to be joined to  
20 the main or basic module, said module is provided with a feedbox for the sand which is taken and mixed with the water under pressure for the Venturi effect.
5. Hydro-machine, according to claims 1, 2, characterized in that it comprises a further module provided with wheels to be coupled  
25 with the main module, said module is endowed with vacuum

cleaner, intaking assembly for liquids, tanks for the additives and/or detergents, particular nozzles like nozzle-foam and nozzle-floor.

6. Hydro-machine, according to claims 1, 2, characterized in that  
5 it comprises another module provided with wheels consisting of a floor-cleaning assembly and vacuum cleaner, moreover, said module comprises a brushes assembly with vertical axis and a rear floor cleaning bar, and it is also provided with some edges for the union with the main or basic module.
- 10 7. Hydro-machine, according to claims 1 - 6, characterized in that the coverings of the main module are movable and can be removed from the main module and applied on any additional module provided with the corresponding coupling device, obtaining continuity between the structures of the main module  
15 and the additional one.
8. Multipurpose hydro-machine, according to claim 7, characterized in that it is provided with quick mechanical, water and electrical connections between the basic module and the additional one.

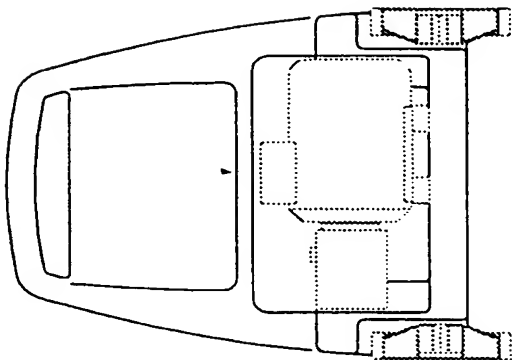


Fig. 1b

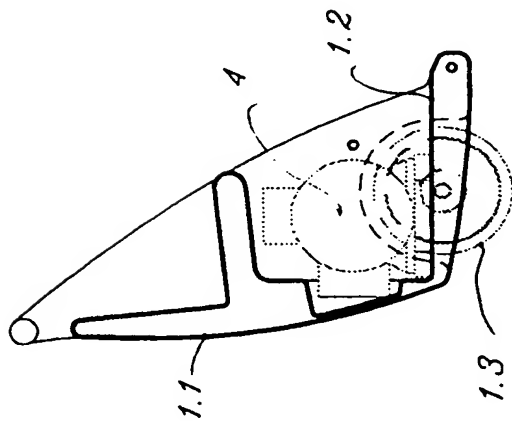


Fig. 1a

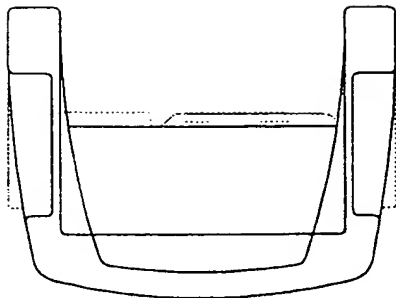


Fig. 1c

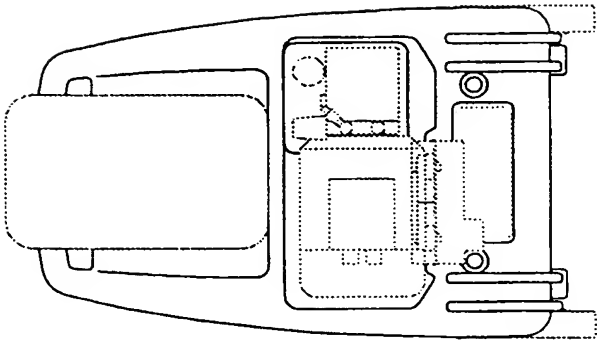


Fig. 2b

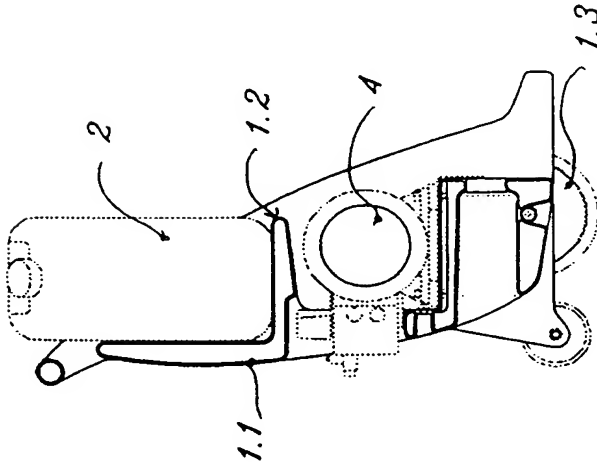


Fig. 2a

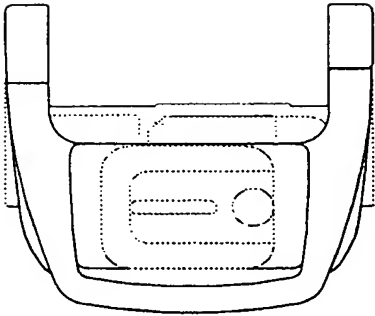
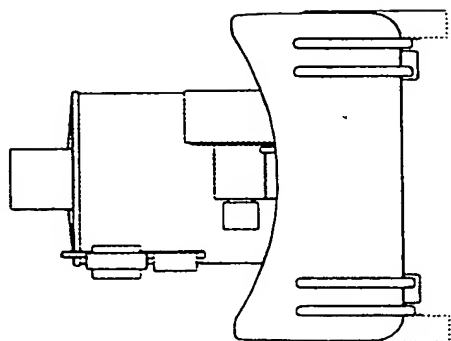
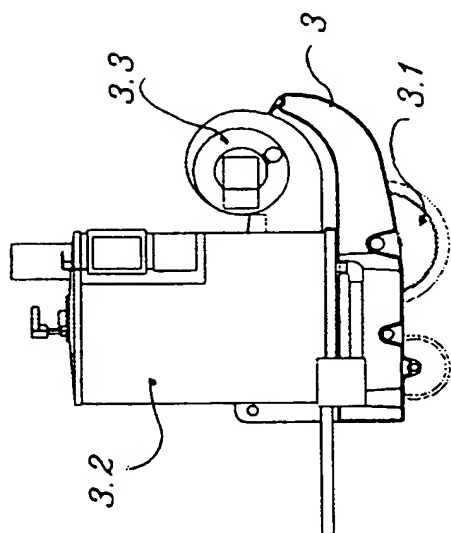


Fig. 2c

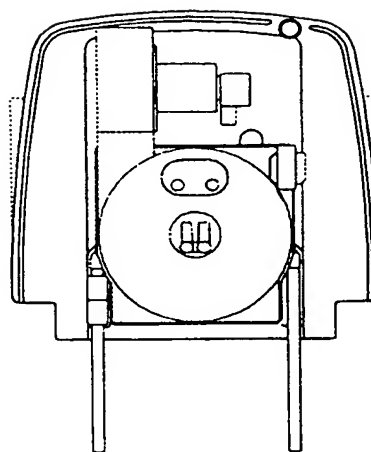




*Fig. 3b*



*Fig. 3a*



*Fig. 3c*

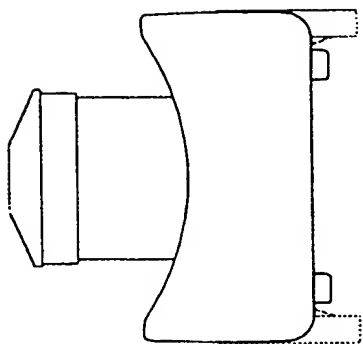


Fig. 4b

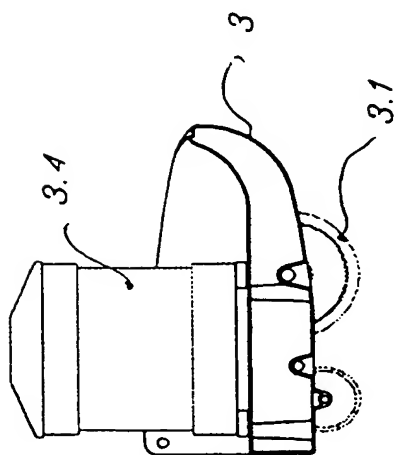


Fig. 4a

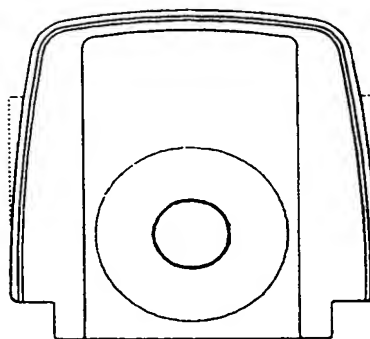


Fig. 4c

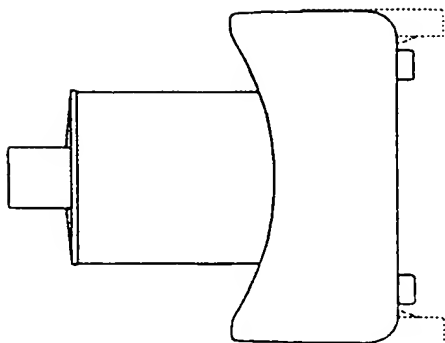


Fig. 5b

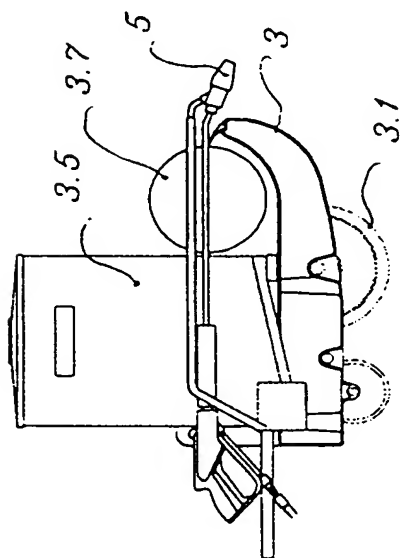


Fig. 5a

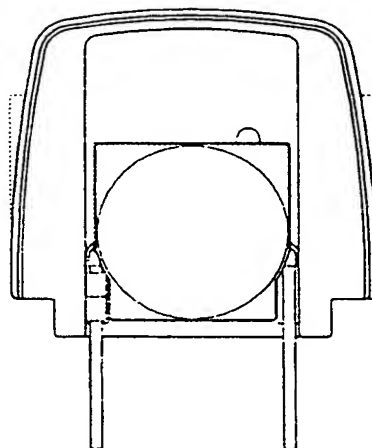
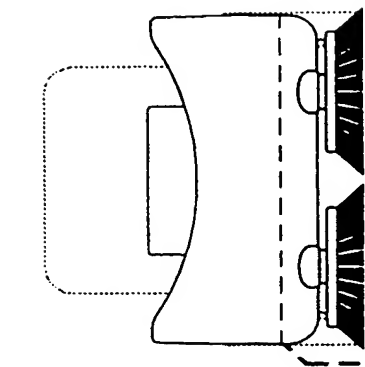
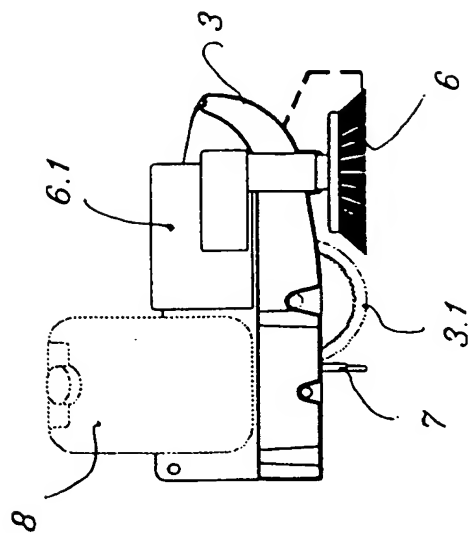


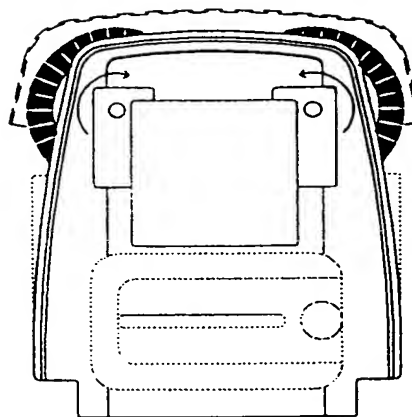
Fig. 5c



*Fig. 6b*



*Fig. 6a*



*Fig. 6c*

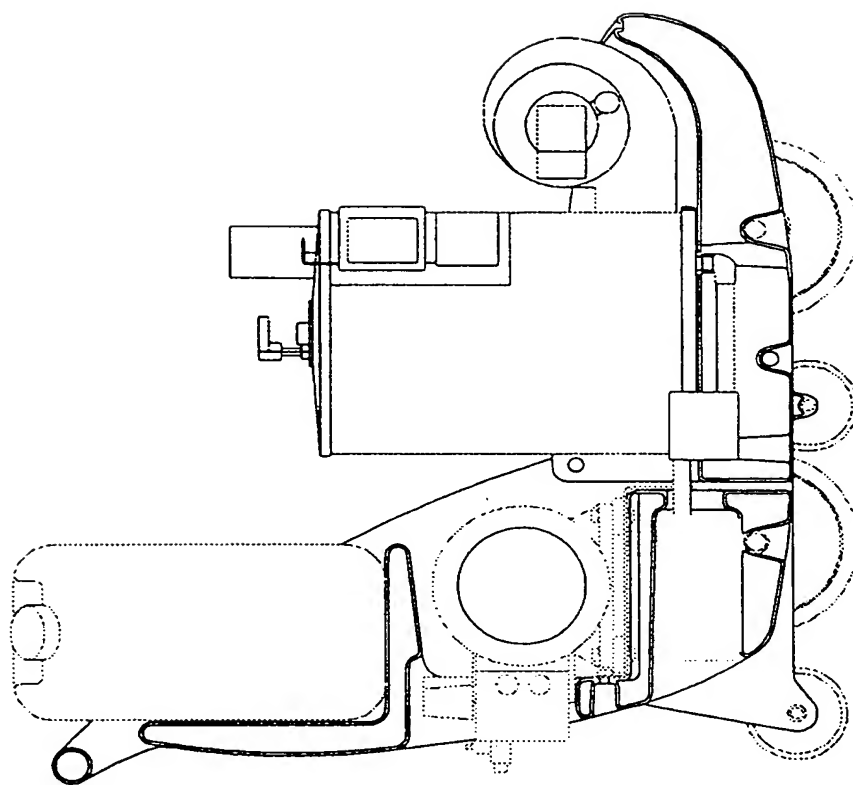


Fig. 7

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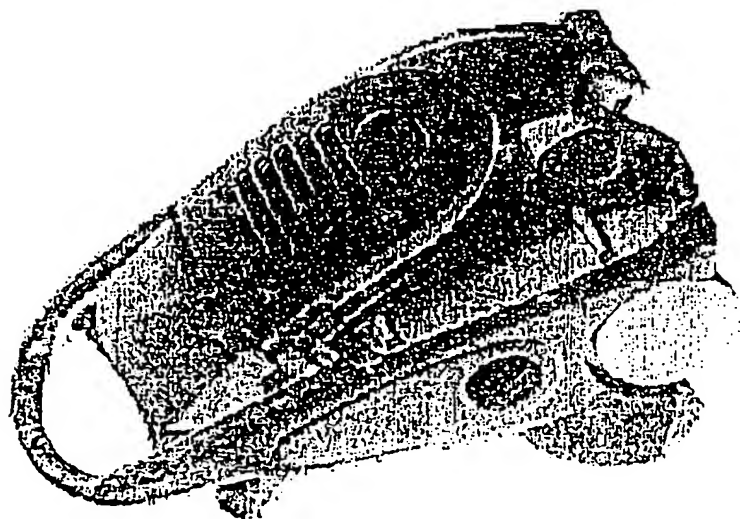


fig. 8

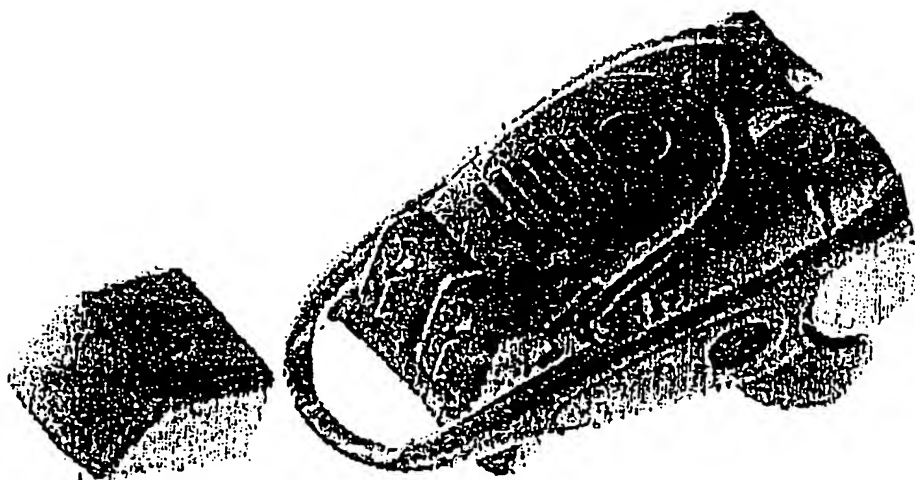


fig. 9

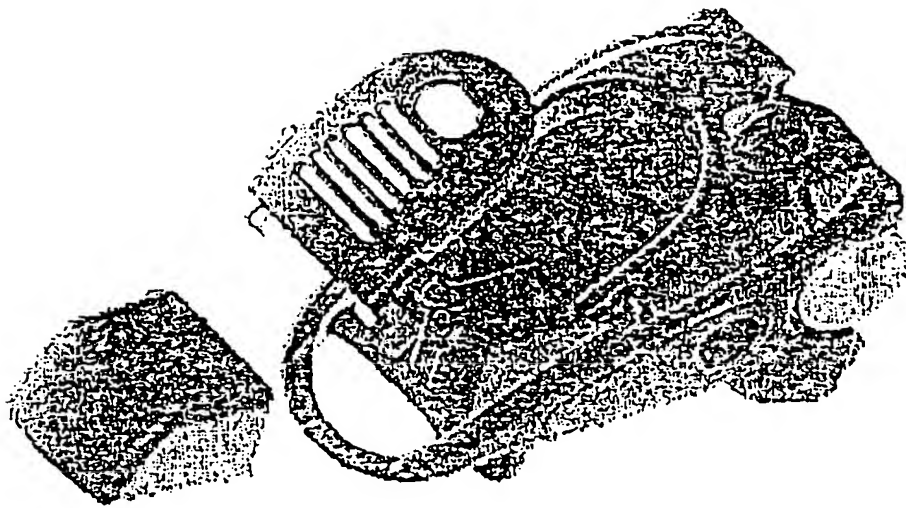


fig. 10

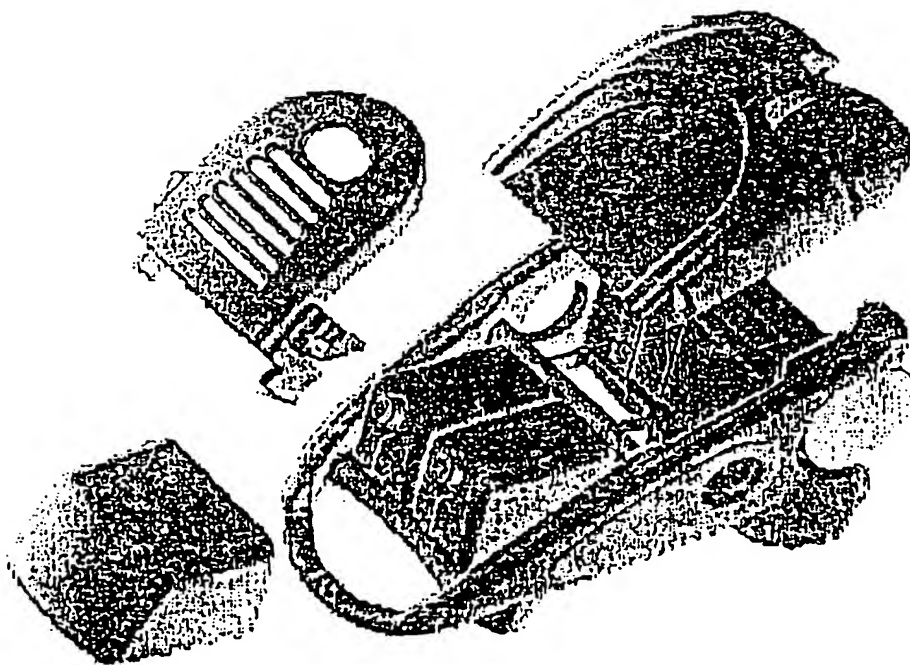


fig. 11

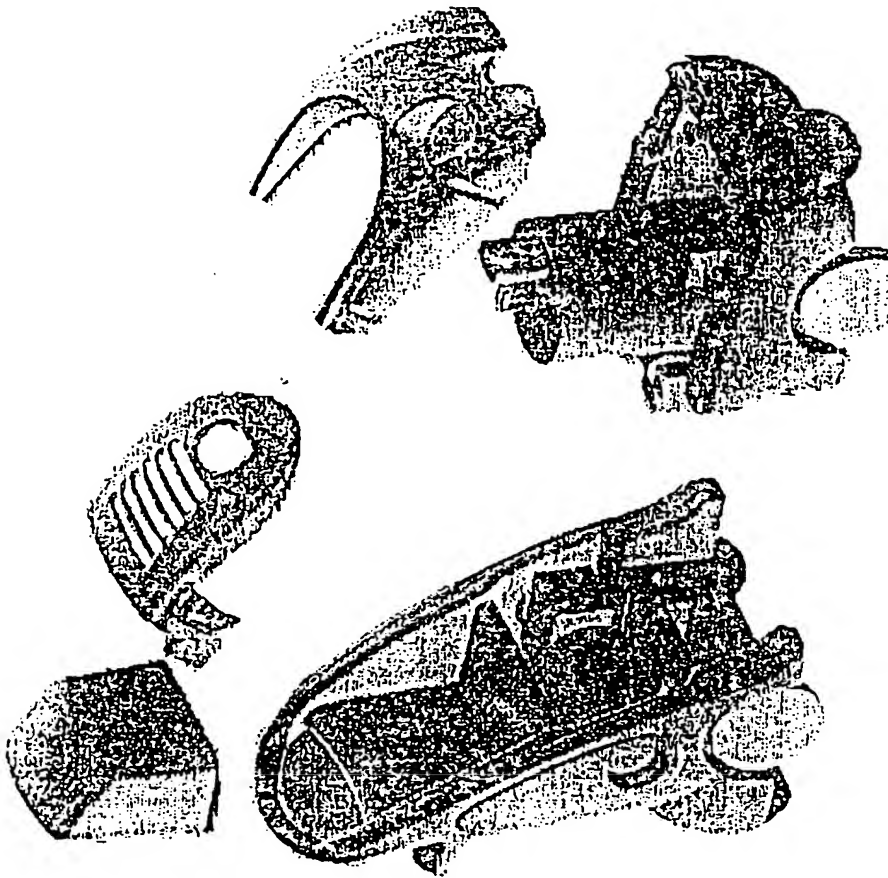


fig. 12

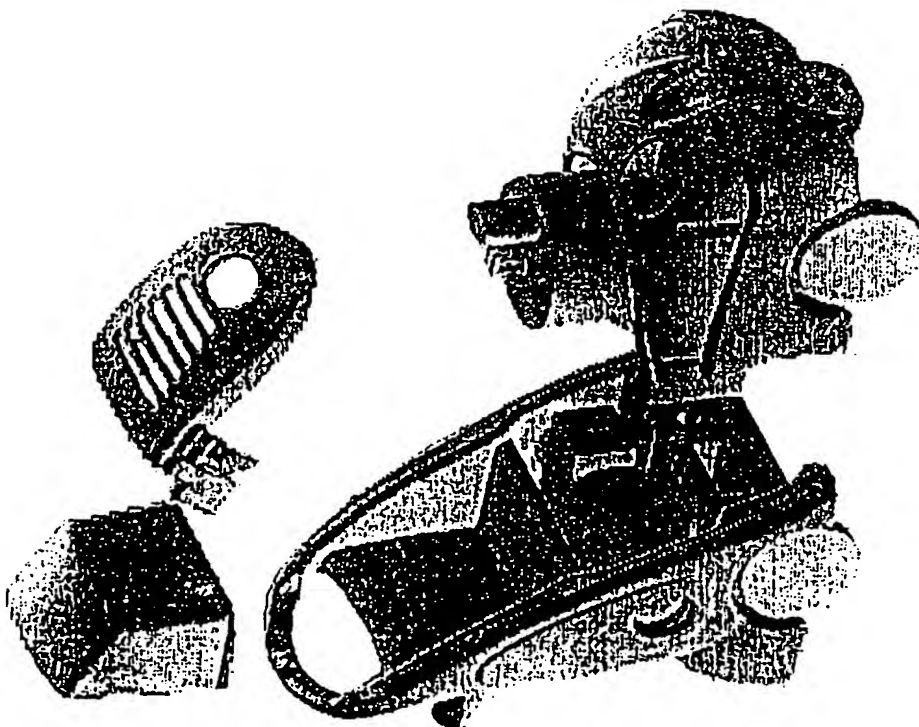


fig. 13



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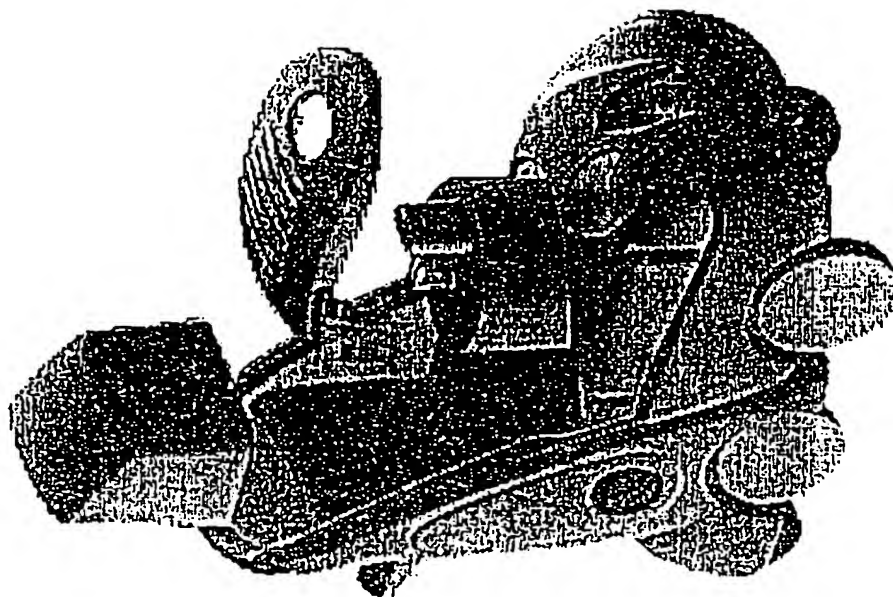


fig. 14

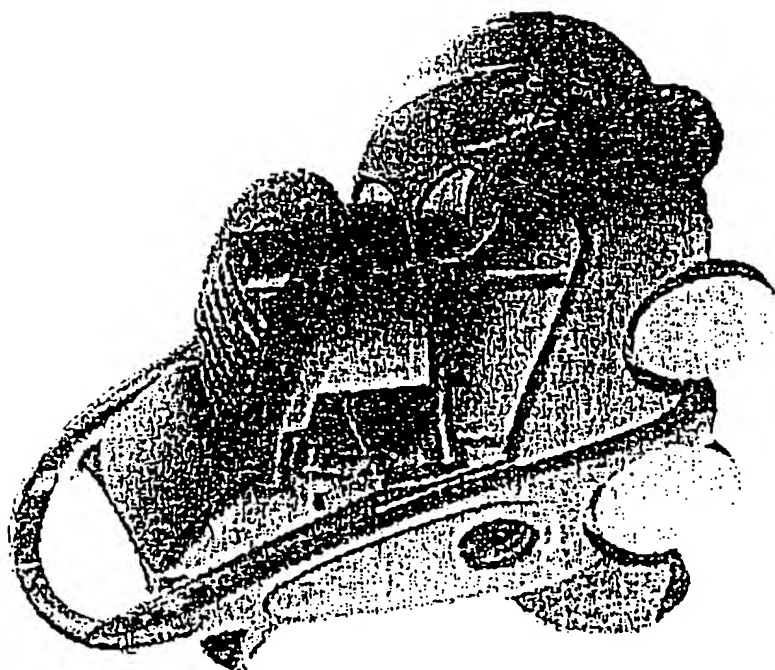


fig. 15

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 99/00136

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 B08B3/02 A47L11/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B08B A47L B24C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 263 223 A (FIEGEL ET AL) 23 November 1993 (1993-11-23) column 2, line 15 - line 39 column 4, line 52 - column 6, line 33; figures	1
Y		3
A		5,8
Y	DE 44 11 040 C (STARKE BRÜCKE IMPORT-EXPORT GMBH) 13 April 1995 (1995-04-13) abstract; figures	3
A		1
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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## INTERNATIONAL SEARCH REPORT

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 934 017 A (KENT) 19 June 1990 (1990-06-19) abstract column 1, line 8 - line 32 column 4, line 16 - column 5, line 1; figures	1,5
A	---	2,6
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